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EXAMINER
AMARI, ALESSANDRO V

ART UNIT	PAPER NUMBER
2872	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/648,525	DAVIS ET AL.
	Examiner	Art Unit
	Amari, Alessandro V.	2872

-- The MAILING DATE of this communication appears on th cover she t with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-37 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-37 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claims 12, 23, 25 and 36 are objected to because of the following informalities:

Regarding claim 12, the phrase "first and second tunable optical elements" lacks proper antecedent basis.

Regarding claim 23, the phrases "the second grating" lacks proper antecedent basis.

Regarding claim 25, the phrase "the first and second tunable optical elements" lacks proper antecedent basis.

Regarding claim 36, it appears that claim 36 should have referenced claim 32. For the purposes of this examination, claim 36 will be treated as being dependent on claim 32.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-6, 8-9, 11, 22, 28-30, 32-34 and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Li U.S. Patent 5,841,918.

In regard to claims 1, 22 and 32, Li discloses (see Figure 1) a tunable optical filter or a method for selectively filtering an optical wavelength band from an input light

comprising: providing a first optical element including a first reflective element (14) for receiving light and reflecting a first wavelength band of the light centered at a first reflection wavelength, the first reflective element characterized by a first filter function as described in column 3, lines 45-54; and providing a second optical element, optically connected to the first optical element to receive the reflected first wavelength band of the light, including a second reflective element (16) for reflecting a second wavelength band of the light centered at a second reflection wavelength, the second reflective element characterized by a second filter function being different than the first filter function as described in column 3, lines 55-64; and tuning one of the first and second reflective elements whereby the first reflection wavelength and the second reflection wavelength are aligned or approximately aligned to reflect a portion of the aligned wavelength bands to an output port as shown in Figure 1 and as described in column 4, lines 1-13.

Regarding claim 2, Li discloses that one of the first and second optical elements is tunable to approximately align the first and second reflection wavelengths as described in column 3, lines 58-67 and column 4, lines 1-18.

Regarding claim 3, Li discloses that both of the first and second optical elements is tunable to approximately align the first and second reflection wavelengths as described in column 3, lines 58-67 and column 4, lines 1-18.

Regarding claim 4, Li discloses (see Figure 1) an optical directing device (12) optically connected to the first and second optical elements; the optical directing device directing the light to the first reflective element, directing the first wavelength band

reflected from the first reflective element to the second reflective element, and directing the second wavelength band reflected from the second reflective element to the output port of the optical directing device as shown in Figure 1 and as described in column 3, lines 41-59.

Regarding claim 5, Li discloses that the optical directing device comprises at least one circulator as described in column 3, line 16.

Regarding claim 6, Li discloses (see Figure 6) that the circulator receives the light at a first port of the circulator, directs the light to the first reflective element through a second port of the circulator, receives the first wavelength band at the second port, directs the first wavelength band to the second reflective element through a third port of the circulator, receives the second wavelength band at the third port, and directs the second wavelength band to a fourth port of the circulator as described in column5, lines 40-61.

Regarding claims 8 and 28, Li discloses that the first reflection wavelength and the second reflection wavelength are substantially aligned to reflect a portion of the aligned wavelength bands to an output port as described in column 4, lines 1-18.

Regarding claim 9, Li discloses that one of the first and second filter functions comprises one of a Gaussian, rectangular and ramped profile as shown in Figure 2a.

Regarding claim 11, 30 and 36, Li discloses that the first reflection wavelength is offset a predetermined spacing from the second reflection wavelength or wherein tuning one of the first and second reflective elements comprises offsetting a first reflection

wavelength and a second reflection wavelength by a predetermined spacing as shown in Figures 2a-2c and as described in column 4, lines 1-13.

Regarding claim 29, Li discloses that the first and second reflective elements have different filter functions as described in column 4, lines 1-18.

Regarding claim 33, Li discloses that tuning one of the first and second reflective elements includes compressing the one of the first and second optical elements as described in column 3, lines 19-24.

Regarding claim 34, Li discloses that tuning one of the first and second reflective elements comprises substantially aligning a first reflection wavelength and a second reflection wavelength as described in column 4, lines 1-18.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li U.S. Patent 5,841,918 in view of Kringlebotn et al. U.S. Patent 6,097,487.

Regarding claim 7, Li teaches the invention as set forth above but does not teach that said optical directing device comprises an optical coupler. Kringlebotn et al. teaches the optical directing device comprises an optical coupler (4) as shown in Figure 5 and as described in column 5, lines 52-67 and column 6, lines 1-10. It would have been obvious to one having ordinary skill in the art at the time the invention was made

to utilize couplers as taught by Kringlebotn et al. in the optical filter of Li in order to optically direct the signals in the filter device.

6. Claims 10 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li U.S. Patent 5,841,918 in view of Kewitsch et al. U.S. Patent 6,236,782.

Regarding claims 10 and 35, Li teaches the invention as set forth above but does not teach that one of the first and second reflective elements is fully apodized and the other of the first and second reflective elements is partially apodized. Kewitsch et al. teaches that one of the first and second reflective elements is fully apodized and the other of the first and second reflective elements is partially apodized as described in column 10, lines 39-67 and column 11, lines 1-10. It would have been obvious to one having ordinary skill in the art at the time the invention was made to apodize the reflective elements of Li as taught by Kewitsch et al. in order to reduce grating sidelobes and eliminate adjacent channel crosstalk.

7. Claims 12-16, 18, 23-27 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li U.S. Patent 5,841,918 in view of Fernald et al. U.S. Patent 6,229,827.

Regarding claims 12-16, 18, and 23-24, Li teaches the invention as set forth above and in regard to claim 15 teaches that at least one of the first and second optical elements is an optical fiber as described in column 3, lines 47-51. In regard to claim 25, Li discloses (see Figure 1) an optical directing device (12) optically connected to the first and second tunable optical elements; the optical directing device directing the light to the first reflective element, directing the first wavelength band reflected from the first

reflective element to the second reflective element, and directing the second wavelength band reflected from the second reflective element to the output port of the optical directing device as shown in Figure 1 and as described in column 3, lines 41-59. Also, in regard to claim 26, Li discloses that the optical directing device comprises at least one circulator (112) as shown in Figure 6.

However, Li does not teach that at least one of the first and second tunable optical elements have an outer cladding and an inner core disposed therein, wherein the first reflective element comprises a first grating disposed in a longitudinal direction of the inner core of the first optical element, and the second reflective element comprises a second grating disposed in a longitudinal direction of the inner core of the second tunable optical element nor that at least one of the first and second optical elements comprises: an optical fiber, having a reflective element written therein; and a tube, having the optical fiber and the reflective element encased therein along a longitudinal axis of the tube, the tube being fused to at least a portion of the fiber nor that at least one of the first and second optical elements has an outer transverse dimension of at least 0.3mm. Li does not disclose a compressing device for compressing simultaneously and axially the first and second tunable optical elements, wherein each of the first and second reflective elements are disposed along an axial direction of each respective first and second tunable element nor a straining device for tensioning axially the first optical element to tune the first reflective element wherein the first reflective element is disposed along an axial direction of the first optical element.

Regarding claims 12 and 23, Fernald et al. teaches that at least one of the first and second tunable optical elements have an outer cladding and an inner core disposed therein, wherein the first reflective element comprises a first grating disposed in a longitudinal direction of the inner core of the first optical element, and the second reflective element comprises a second grating disposed in a longitudinal direction of the inner core of the second tunable optical element as shown in Figure 1 and as described in column 3, lines 47-63. Regarding claim 13, Fernald et al. also teaches that (see Figure 1) at least one of the first and second optical elements comprises: an optical fiber (10), having a reflective element (12) written therein; and a tube (20), having the optical fiber and the reflective element encased therein along a longitudinal axis of the tube, the tube being fused to at least a portion of the fiber as described in column 4, lines 23-25. Regarding claims 14 and 24, Fernald et al. also teaches that at least one of the first and second optical elements has an outer transverse dimension of at least 0.3mm as described in column 1, lines 60-61. Regarding claims 16 and 27, Fernald et al. also discloses a compressing device for compressing simultaneously and axially the first and second tunable optical elements, wherein each of the first and second reflective elements are disposed along an axial direction of each respective first and second tunable element as described in column 1, lines 57-67 and column 2, lines 1-3 and lines 42-44. Regarding claim 18, Fernald et al. teaches a straining device for tensioning axially the first optical element to tune the first reflective element, wherein the first reflective element is disposed along an axial direction of the first optical element as disclosed in column 2, lines 1-3. It would have been obvious to one having ordinary skill

in the art at the time the invention was made to incorporate the compression tuned grating as taught by Fernald et al. in the optical system of Li in order to tune the filter.

Regarding claim 37, Li teaches (see Figure1) a compression-tuned optical filter comprising: a first optical element including a first reflective element (14) for receiving light and reflecting a first wavelength band of the light centered at a first reflection wavelength as described in column 3, lines 45-54; and a second optical element, optically connected to the first optical element to receive the reflected first wavelength band of the light, including a second reflective element (16) for reflecting a second wavelength band of the light centered at a second reflection wavelength, as described in column 3, lines 55-64; whereby the first reflection wavelength and the second reflection wavelength are aligned to reflect a portion of the aligned wavelength bands to an output port as shown in Figure 1 and as described in column 4, lines 1-13. Li fails to teach that at least one of the first and second optical element has outer dimensions along perpendicular axial and transverse directions, the outer dimension being at least 0.3 mm along said transverse direction, at least a portion of the respective first or second tunable element having a transverse cross-section which is contiguous and comprises a substantially homogeneous material; and the respective first or second reflective element being axially strain compressed so as to change respective first or second reflection wavelength without buckling the respective first or second tunable element in the transverse direction. Fernald et al. teaches that at least one of the first and second optical element has outer dimensions along perpendicular axial and transverse directions, the outer dimension being at least 0.3 mm along said transverse

direction as described in column 1, lines 60-61, at least a portion of the respective first or second tunable element having a transverse cross-section which is contiguous and comprises a substantially homogeneous material as described in column 1, lines 65-67; and the respective first or second reflective element being axially strain compressed so as to change respective first or second reflection wavelength without buckling the respective first or second tunable element in the transverse direction as described in column 2, lines 1-3. It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the compression tuned grating as taught by Fernald et al. in the optical filter of Li in order to tune the filter.

8. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li U.S. Patent 5,841,918 in view of Fernald et al. U.S. Patent 6,229,827.

Regarding claim 17, Li in view of Fernald et al. discloses the claimed invention except for a first compressing device for compressing axially the first tunable optical element to tune the first reflective element, wherein the first reflective element is written in the longitudinal direction in the first tunable optical element; and a second compressing device for compressing axially the second tunable optical element to tune the second reflective element, wherein the second reflective element is written in the longitudinal direction in the second tunable optical element. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize first and second compressing elements to tune each reflective element, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.,* 193 USPQ 8.

9. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li U.S. Patent 5,841,918 in view of Morey et al. U.S. Patent 5,007,705.

Regarding claim 19, Li teaches the invention as set forth above but does not further teach a heating element for varying the temperature of the first optical element to tune the first reflective element to reflect the selected first wavelength band. Morey et al. teaches a heating element for varying the temperature of the first optical element to tune the first reflective element to reflect the selected first wavelength band as described in column 4, lines 1-8. It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the heating element of Morey et al. in the optical filter of Li in order to tune the filter.

10. Claims 20, 21, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li U.S. Patent 5,841,918 in view of Putnam et al. U.S. Patent 6,310,990.

Regarding claims 20, 21 and 31, Li teaches the invention as set forth above but does not further teach a first compressing device for axially compressing at least the first tunable optical element to tune the first reflective element, responsive to a displacement signal, wherein the first reflective element is disposed axially along the first tunable element; and a displacement sensor, responsive to the compression of the first tunable optical element, for providing the displacement signal indicative of the change in the displacement of the first tunable optical element or wherein the displacement sensor includes a capacitance sensor coupled to the first tunable optical element for measuring the change in the capacitance that depends on the change in the

displacement of the first tunable optical element. Putnam et al. does teach (see Figure 2) a first compressing device (50) for axially compressing at least the first tunable optical element to tune the first reflective element, responsive to a displacement signal, wherein the first reflective element is disposed axially along the first tunable element as shown in Figure 1; and a displacement sensor (24), responsive to the compression of the first tunable optical element, for providing the displacement signal indicative of the change in the displacement of the first tunable optical element as described in column 5, lines 51-67 and column 6, lines 1-6 or wherein the displacement sensor includes a capacitance sensor (72, 74) coupled to the first tunable optical element for measuring the change in the capacitance that depends on the change in the displacement of the first tunable optical element as described in column 6, lines 1-6. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the optical structure as taught by Putnam et al. in the optical filter system of Li in order to provide feedback control for the tuning of the optical filter.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (703) 306-0533. The examiner can normally be reached on Monday-Friday from 8:00 am to 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on (703) 308-1687. The fax phone numbers for the organization where this application is assigned is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

ava AVA
January 4, 2002

Cassandra Spyrou
Supervisory Patent Examiner
Technology Center 2800